EXECUTIVE summary

Water Environment Research Foundation

Stock No. 98WWR1P

URBAN MANAGEMENT POLICIES

Benefits

- Methods outlined for removing wet weather contaminants and disinfecting bacteria and other pathogens can be built at half the cost and one-tenth the footprint of conventional primary clarification and disinfection systems. Could save $20 billion nationally.
- Presents transferable protocols, performance and design relationships, and operating strategies that can be adapted by other water agencies for the planning and design of combined sewer overflow control facilities.
- Valuable data can help shape future water quality standards and methods used to measure the health and progress of watershed management.

Related Products

Best Practices for Wet Weather Wastewater Flows (stock no. 00CTS6)

Optimization of Vortex Separator Removal Efficiencies for CSO Treatment (stock no. D41002)

Assessment of Technologies for Screenings, Floatable Control and Screenings Handling (stock no. 00CTS4)

For more, visit www.werf.org and click on the "Product Catalog."

Related Ongoing Research

Identifying and Communicating the Benefits and Risks of Disinfecting Wet Weather Flows (project no. 00-HHE-6)

Available Formats

Soft cover with CD-ROM and free PDF online

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Wet Weather Demonstration Project in Columbus, Georgia

The Columbus Water Works, Columbus, Ga., conducted three demonstration programs that focused on the middle Chattahoochee River and addressed national needs in the areas of wet weather water quality and environmental infrastructure. Each project used full-scale environmental measurements to develop cost-effective protocols and innovative technological solutions.

A team of national experts under the peer review program of the Water Environment Research Foundation provided technical review of various aspects of the projects. The intent of the peer review for the Columbus program was to address the technical issues of the study that relate to transferable methodologies.

This report summarizes findings of the three wet weather demonstration projects. The report includes information on transferable, cost-effective protocols, performance and design relationships, and operating strategies that can be adapted by other water agencies for the planning and design of combined sewer overflow (CSO) control facilities. One described approach for removing wet weather contaminants and disinfecting bacteria and other pathogens can be built at half the cost and one-tenth the footprint of conventional primary clarification and disinfection systems. The potential national cost savings could approach $20 billion.

Water Quality Improvements

The overall objectives of the project were to demonstrate water quality measurements, modeling techniques, and control technologies for reducing wet weather pollutant loads to protect water uses. Specific objectives were to provide:

- Performance testing, operation and optimization, and cost evaluation of alternative direct treatment processes for CSO. Treatment goals included reducing pollutants from

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CSOs including physical contaminant reductions and chemical and UV disinfection.

- Measurement protocols for watershed monitoring that provide a scientific basis for assessing watershed health and water quality objectives that are protective of beneficial uses.
- Calibration techniques for U.S. EPA's BASINS model and comparison to spreadsheet models that are both representative of watershed loadings and provide the basis for prioritizing and measuring long-term watershed progress.
- Development of frameworks for source water protection, TMDL allocations, and watershed management strategies that are based on project data measurement and technology findings.
- Coordination and application of emerging U.S. EPA, Georgia EPD and Alabama Department of Environmental Management regulatory policies to the Middle Chattahoochee River watershed.
- Improved communications through partnering, community programs, and outreach.

The three demonstration projects are detailed below:

CSO Technology Testing. The CSO demonstration project tested an array of side-by-side full-scale processes for solids separation and disinfection. Hydraulic controls permitted optimization of CSO capture and use of available energy in the drainage system to drive the treatment processes. Solids separation processes included screening, vortex separation, grit separation, and compressed media filtration. Disinfection alternatives included sodium hypochlorite, chlorine dioxide, peracetic acid, and UV. The report provides protocols for characterization and performance measurements, design methods for optimizing process components against target pollutant removals, operation and maintenance issues and procedures, and a quantification approach for pollutant yield reductions (mass per acre per year) and total maximum daily load (TMDL) strategies. Cost-effective applications are presented.

Watershed Assessment and Management. This project included extensive chemical, biological, and physical measurements at multiple creek and river locations throughout the Middle Chattahoochee River watershed. Field data were used to calibrate the BASINS Model, which assesses watershed health, determines compliance with water quality standards, and prioritizes concepts for watershed management. Watershed issues include source water protection, maintaining or improving water quality in healthy areas, and mitigating water quality impairment in problem areas. The report provides protocols for watershed characterization, model calibration, and pollutant yield quantification. Watershed management strategies are presented that are based upon measurement and control technology findings.

Source Water Assessment and Protection. This study examined flow corridors and the dynamics of source water supplies to seven drinking water intakes in the Middle Chattahoochee River watershed. Field surveys were used to compile inventories of potential contaminants. Strategies were developed for early warning, progress monitoring, and watershed management.

A regional source water assessment and protection plan with interstate stakeholders was developed to build a prevention barrier to drinking water contamination. Basic activities included inventories of potential hazards, susceptibility evaluations, strategies to prevent contamination, and public communication.

Susceptibility evaluations included water body measurements to define the dilution and travel time propagation of potential contamination. Recommended protection strategies include regional policies for watershed management and protection, an on-line communications network, real-time watershed monitoring, and operational contingency measures. Real-time monitoring of high impact watersheds and water plant intakes will provide an early warning of potential contamination. An integrated monitoring network will also provide the baseline and measure of watershed progress.

Findings and Conclusions

These studies demonstrate sound-science protocols for measuring, modeling, and quantifying pollutant yields. These protocols provide a basis for watershed control, design, and progress measurement. Pollutant yields are directly correlated to impervious area and can be related to water use targets such as water quality standards and aquatic biology. These protocols form the basis for an adaptive or cyclic TMDL implementation process.

Monitoring both combined sewer systems and creek watersheds allows the erodible portion of the watershed loading to be segregated from the build-up/wash-off component. This distinction allows practitioners to quantify both components and set reduction goals that may be achieved by attenuation and first flush impervious area controls.

Among the recommendations of the report, the authors advise that municipalities and other watershed agencies create a stakeholder organization to continue the dialog and partnership between the water systems and other stakeholders in the region. In addition, they suggest following their lead in establishing real-time monitoring at select locations in the watershed to help track and monitor long-term trends in water quality and to serve as early warning devices if a sudden change in raw water quality is experienced. They also recommend development of a communication network that expands the geographic information system pollutant source database initiated under this project. This network would help distribute information from the monitoring stations to the stakeholders and other interested parties.

This work complements WERF's ongoing research into effective treatment of wet weather and CSOs. By providing peer review for this project, WERF was able to assure the study employed sound science — a benefit to Columbus and to WERF subscribers who are able to share in the knowledge gained.

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